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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/663,793
Filing Date: September 17, 2003
Appellant(s): TAKEUCHI ET AL.

Michael A. Makuch
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed February 13, 2008 appealing from the Office action mailed June 15, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct.

The changes are as follows: In Ground 2, claims 2-4 were rejected using the admitted state of the prior art in view of Rice and '038 (Japan 05-278308), and further in view of WO 01/54188, Pico, deceased et al, and Sherstinsky et al. Appellant's statement of the Ground of Rejection did not reference the use of '038.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

2003/0154919	RICE ET AL	8-2003
4,115,507	PICO, DECEASED ET AL	9-1978
5,634,266	SHERSTINSKY ET AL	6-1997
05-278038	JAPAN	10-1993
01/54188	WO	7-2001

The admitted state of the prior art, pages 1-4 of the specification of the present application.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

A. Claim 1 stands finally rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted state of the prior art in view of Rice et al (US 2003/0154919) and Japan 05-278038 (hereinafter '038).

The admitted state of the prior art, *at pages 1-4 of the specification of the present application,* teaches that it is well known to provide an internal member to be disposed in a vacuum processing apparatus in the form of an electrostatic chuck. It is known to provide this electrostatic chuck with holes formed on the surface as gas injection holes. Furthermore, it is known to deposit a coating film of ceramic material onto the surface of this chuck by means of plasma spraying. Furthermore, the admitted state of the prior art teaches that in order to form the ceramic coating film on the chuck with gas injection holes, it is required that coating material not enter the holes. The admitted state of the prior art teaches that known methods of masking the holes would include using padding plugs of metal, which suffer from the problem of the coating material conjugating to the metal material of the padding plugs, with removal of the plugs being a problem because they are welded to the coating film.

The admitted state of the prior art teaches all the features of this claim except the use of the metal padding plug coated with a metal-resin composite layer as claimed, so that the plugs have a core of metal and a metal-resin composite layer covering the core member, with the metal-resin composite layer being a complex consisting of a metal

material and a resinous material exhibiting nonconjugative property to the coating film, as in step (A), and removing the padding plugs after coating (step C).

However, Rice teaches using a masking apparatus in a thermal spray process. *Figure 4B and paragraphs [0035], [0040] – [0041].* In Rice, a cup 62 is provided as the mask that can be made of a material such as thin sheet metal including aluminum or steel that can withstand the temperature of droplets from the thermal spray device. *Figure 4B and paragraphs [0040]-[0041].* Rice teaches that the cup can be further supplied with a coating to reduce the adherence of thermal spray droplets, such as TEFLON or a mold release coating. *Paragraph [0044].* Rice indicates that thermal spraying processes can conventionally include spraying using plasma. *Paragraph [0002].*

'038 teaches that a desirable mold release coating for a die made of a material such as steel is provided by electrolessly plating the mold with nickel containing 5-25 volume % polytetrafluoroethylene (PTFE) particles, producing a coating of a composite of nickel metal and PTFE resin. *See the Abstract and paragraphs [0007] and [0008].* While examples have P also present, this is merely exemplary, and only nickel and PTFE are required. *See paragraphs [0007], [0009], [0016], [0017], [0019] and [0021].*

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the admitted state of the prior art to use metal padding plugs that have been coated with a nickel-PTFE release coating to mask the gas holes during coating as suggested by Rice and '038 in order to provide an metal padding plug that does not stick to the coating material, as the admitted state of the prior art teaches

the thermal spraying, by plasma spraying, of chucks with holes that need to be masked during spraying and that the use of metal padding plugs during spraying has the problem of the coating material conjugating to the metal material of the padding plugs, with removal of the plugs being a problem because they are welded to the coating film, and Rice teaches that thermal spray masking devices can be metal such as aluminum or steel, and are desirably provided with a mold release coating to prevent thermal spray material from sticking (joining, conjugating) to the masking device, and further teaches that TEFLON (also known as PTFE) is also a material to which thermal spray coatings do not stick, and '038 teaches that a desirable mold release coating is a combination of nickel and PTFE. Thus, the use of the suggested mold release coating on the masking metal padding plug will provide a metal-resin complex, consisting of metal material and resinous material (nickel-PTFE), composite layer covering the circumferential surface of the core of metal padding plug; and this metal-resin complex will remove the problem of spray material conjugating or sticking to the plugs, as it has nonconjugative properties to the coating film (as Rice provides that mold release coating and TEFLON (PTFE) will both reduce adherence of thermal spray droplets). It further would have been obvious to modify the admitted state of the prior art in view of Rice and '038 to remove the padding plugs after coating with an expectation of providing a desirable use of the chuck, because the plugs would need to be removed so that the gas injection holes could be used for injecting gas as desired.

B. Claims 2-4 stand finally rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted state of the prior art in view of Rice and '038 as applied to claim 1 above, and further in view of WO 01/54188 (hereinafter '188), Pico, deceased et al (US 4115507) and Sherstinsky et al (US 5634266).

The admitted state of the prior art in view of Rice and '038 teaches all the features of these claims except (1) the surface material of the chuck (claims 2, 4), (2) the hole diameters (claims 2, 4), (3) the core member of steel wire (claims 2, 4), (4) the thickness of the metal-resin composite layer (claims 2, 4), (5) the projection of the plugs (claims 2, 4), (6) the multiple layers (to provide electrode layer embedded in insulating layer) (claim 3). As to the core member material of steel wire, Rice does teach that the base mask material to be coated can be steel, and '038 also teaches that the substrate can be steel as discussed in the rejection above. As to the insulating material coating film, the admitted state of the art teaches that it is known to plasma spray aluminum oxide (Al_2O_3) on an electrostatic chuck. *Page 2 of the specification of the present application.* As to the electroless plating of nickel with fluoropolymer (PTFE) particles dispersed therein, this is taught by '038 as discussed in the rejection above (*see paragraph [0007] of '038*).

'188 teaches that it is known to provide an electrostatic chuck member with layers of insulating material of oxide ceramic such as aluminum oxide (Al_2O_3) with an electrode layer applied between the aluminum oxide layers. *Page 7 of the translation.* The chuck substrate surface material can be aluminum. *Page 14, in "Practical Example 1", of the translation.* A layer of nickel-aluminum alloy can be provided on that surface

providing an aluminum alloy surface contacting the insulating layers. *Page 14, in "Practical Example 1", of the translation.* An aluminum oxide layer can be plasma sprayed over the aluminum and aluminum alloy surface. *Paragraph bridging pages 14-15 of the translation.* Then a tungsten electrode layer is plasma sprayed over the aluminum oxide layer. *Paragraph bridging pages 14-15 of the translation.* Then another aluminum oxide layer is plasma sprayed over the tungsten layer. *Paragraph bridging pages 14-15 of the translation.*

Pico teaches using masking plugs to prevent coating areas of a substrate with perforations, or holes, with the plugs inserted into the perforations. *Column 4, lines 50-55 and column 1, lines 25-35.* The plugs extend past the substrate surface a distance desirably at least twice the thickness of the coating to be applied to facilitate removal of the plug after coating. *Column 4, lines 55-65.* The plugs can be metal and can be coated with a release agent to help prevent coating from sticking. *Column 5, lines 1-15.*

Sherstinsky teaches that when providing electrostatic chucks with gas injection holes, the holes can desirably be 0.25-0.5 mm, for example. *Column 5, line 60 through column 6, line 10 and column 4, lines 25-30.*

It would have been obvious to one of ordinary skill in the art at the time the invention was made to (1) (6) modify the admitted state of the prior art in view of Rice and '038 to use aluminum/aluminum alloy surface materials and to provide an aluminum oxide insulating layer by plasma spraying, followed by a tungsten electrode layer by plasma spraying, followed by an aluminum oxide insulating layer by plasma

spraying as suggested by '188 with an expectation of providing a desirable electrostatic chuck, because the admitted state of the prior art in view of Rice and '038 teaches to apply plasma sprayed material to an electrostatic chuck with cooling holes and to mask the cooling holes with plugs during spraying, and '188 teaches that a desirable electrostatic chuck includes aluminum/aluminum alloy surface materials and an aluminum oxide insulating layer provided by plasma spraying, followed by a tungsten electrode layer provided by plasma spraying, followed by an aluminum oxide insulating layer provided by plasma spraying. It would have been obvious to use the padding plug process as taught by the admitted state of the prior art in view of Rice and '038 for each layer (during the tungsten layer application, metal plugs alone would be obvious to use if the tungsten does not stick as aluminum oxide would or the claimed metal plug would also read on the metal coated plug used with the aluminum oxide layers, since coating is not prevented on the plug in step (E)) in order to prevent blocking the holes during each process. (5) It would further have been obvious to modify the admitted state of the prior art in view of Rice, '038 and '188 to optimize the projection height of the plugs beyond the surface by routine experimentation as suggested by Pico in order to provide optimum plug removal, because the admitted state of the prior art in view of Rice, '038 and '188 teaches to use masking padding plugs during the coating and Pico teaches that when masking holes using plugs it is desirable to project them at least twice the height of the coating to be applied to allow for easy removal, which suggests optimizing the height of the plugs as a known result effective

variable. (2) It would further have been obvious to modify the admitted state of the prior art in view of Rice, '038, '188 and Pico to use a hole diameter of 0.5 mm, for example, as suggested by Sherstinsky in order to provide desirable gas injection, because the admitted state of the prior art in view of Rice, '038, '188 and Pico teaches to use an electrostatic chuck with gas injection holes, and Sherstinsky teaches that electrostatic chuck gas injection holes can desirably be in a range including 0.5 mm in diameter and where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). (3) It would further have been obvious to modify the admitted state of the prior art in view of Rice, '038, '188, Pico and Sherstinsky to use steel wire as the core member, because the admitted state of the prior art teaches to use a metal base, Rice teaches to use a base masking material of steel, and Sherstinsky teaches that the holes to be plugged would only be 0.5 mm in diameter, for example, and thus the base material would be desirably steel in the shape of a wire to fit the holes. (4) It would further have been obvious to modify the admitted state of the prior art in view of Rice, '038, '188, Pico and Sherstinsky to optimize the coating thickness based on the size of the metal plug and holes to be coated and the amount of protection needed, as '038 teaches that particles of 1 micron of PTFE (abstract) can be used, thus allowing for a coating of 1 micron or more thickness.

(10) Response to Argument

A. Ground 1: The 35 USC 103(a) rejection of claim 1 using the admitted state of the prior art in view of Rice et al (US 2003/0154919) and Japan 05-278308 (hereinafter '038)

Appellant first, at page 5 of the Appeal Brief of February 13, 2008, provides a discussion of the Examiner's previous rejection of the claims. The Examiner notes that the full statement of the Examiner's rejection is provided in the **Grounds of Rejection** above.

At pages 6-7 of the Appeal Brief, appellant further argues that the rejection of claim 1 is based on improper hindsight because neither '038 nor Rice could have supplied the motivation necessary to support their asserted combination with the admitted prior art. The Examiner has reviewed appellant's arguments at pages 6-7 of the Appeal Brief, however, she maintains her position that the rejection is proper. It is the Examiner's position that the combination of the cited art clearly provides the suggestion to provide metal-resin (of nickel-polytetrafluoroethylene (PTFE)) coated metal plugs when plasma spraying to form the ceramic coated film as provided by claim 1. The Examiner has first provided "the admitted state of the prior art" as the primary reference. As discussed in the **Grounds of Rejection** above, this admitted state of the prior art provides the known use of padding plugs of metal to mask holes in electrostatic chucks over which plasma sprayed coatings of ceramic are to be provided. As to the suggestion to provide a metal-resin (nickel-PTFE) coating over the metal plugs when providing this plasma sprayed ceramic coating, the Examiner has provided the

two references to Rice and '038. First, one of ordinary skill in the art would note Rice, which teaches, in paragraph [0044], that when thermal spraying (which as noted by Rice, includes plasma spraying, see paragraph [0002]), it is well known to be beneficial to provide a TEFLON (which would be a PTFE) or mold release coating over a previously described masking cup material (previously described in paragraph [0040] as metal such as aluminum or steel) to "reduce the adherence of thermal spray droplets". While Rice only specifically mentions the term "ceramic" in regard to the general thermal spray coating features in paragraph [0002] as well known thermal spray material, when read in the context of the invention of Rice, for example in paragraph [0034] teaching that "Various coating materials may be utilized . . .", with no limit as to what the coating material may be, it is clearly suggested that Rice is directed to conventional materials that one of ordinary skill in the art would expect to be thermally sprayed, which directs such a person back to the "well known" material of paragraph [0002] as to what would be acceptable. Thus, one of ordinary skill in the art would clearly expect the PTFE and mold release materials of paragraph [0044] of Rice to be non-adherent to thermal spray droplets of the well known coating materials listed in paragraph [0002]. Furthermore, while cup 62 of Rice is not a padding plug, the cup 62 operates as a masking material that protects certain areas of the crankcase (in Rice's case) from overspray of the thermal spray coating on the areas where it is desired to be applied (paragraphs [0035]–[0036]). Rice further indicates that the cup will receive high temperature thermal spray droplets, since the material must "withstand the

temperature of the droplets from thermal spray device 40" (paragraph [0040]) and will be impacted by the droplets, since the desire to reduce adhesion of the droplets is present (paragraph [0044]). As well, since the desire is to spray surface 16 (see figure 2 and paragraph [0033]), and the masking cup goes right up to the edge of surface 16 (see figure 4B), it appears that the edge of the cup, at least, will get a significant exposure to the spray from the thermal spray gun. From the description in Rice, therefore, one of ordinary skill in the art would understand that the masking material and mold release coating must be able to withstand general thermal spraying, including plasma spraying, conditions, and would expect the masking material and mold release coatings to stand up to the conditions described by the admitted state of the prior art. Furthermore, one of ordinary skill in the art would understood that the teaching of using a mold release material to reduce adherence of thermal spray droplets would apply to various masking materials for thermal spray, rather than simply a cup, as it is clearly the applied material (TEFLON or mold release) that is designed to reduce adherence, not the shape of the cup 62. Appellant has provided only inferences that the cup in Rice is not exposed to direct plasma spraying, but as discussed above, it is the Examiner's position that the teaching of Rice would be understood to be useful for various masking materials under various thermal spray conditions, given the general teachings of Rice of exposure of the mask. The technique for improving a known masking device (the cup) for thermal spraying by applying a coating to reduce adherence of thermal spray droplets would clearly be applicable to a different masking device (the plugs) for

thermal spraying, especially given the known problem of thermal spray coatings sticking (conjugating) to the plugs, given that the improvement was part of the ordinary capabilities of a person of ordinary skill in the art, as the same improvement would be applied with the expectation of the same reduced adherence results. As to damage of the cup vs. no damage of the present plugs, the Examiner notes that there is no indication that the coated cup will be damaged from the thermal spray in Rice. In fact, it is described that the cup can be reusable with periodic cleaning (paragraph [0044]).

As to the further use of a mold release coating of nickel-PTFE as described by '038, it is the Examiner's position that one looking at the combination of the admitted state of the prior art and Rice would be directed to determine what acceptable "mold release" coatings would be, since Rice teaches the use of mold release coatings, but does not provide limitations as to what these coatings would be made of. Therefore, one of ordinary skill in the art would be directed by the teaching of Rice to look to the art of "mold release coatings" to determine acceptable coatings. Thus, while '038 is not concerned with mold release coatings for masking plugs used in thermal spraying, it is still relevant art, as one of ordinary skill in the art would be directed to look at "mold release coatings" in general. Furthermore, from a reading of the previously considered references, the admitted state of the prior art and Rice, one of ordinary skill in the art would understand that the materials described by '038 would be materials that would acceptably be used in a thermal spray process, as Rice clearly indicates that PTFE (TEFLON) can be used to reduce adherence of thermal spray droplets without a

negative effect (paragraph [0044]) and both Rice and the admitted state of the prior art note that metal can be thermally sprayed on without being destroyed (note Rice, paragraph [0040], and the admitted state of the prior art noting the use of metal plugs, on which the coating adheres but is not destroyed). Therefore, when one of ordinary skill in the art looks at known mold release coatings, such as provided by '038, as directed by Rice, that person would understand that a metal-PTFE coating would be acceptably used in thermal spraying processes with the PTFE providing desirable non-adherence (non-conjugative) properties to thermal sprayed materials and without the metal being destroyed, even though '038 does not specifically say so, based on the combination of all three references. As a result, although appellant argues that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). Here, as discussed above, the rejection is based on the references and admitted state of the prior art as cited, not the knowledge gleaned only from appellant's disclosure of their invention.

At pages 7-8 of the Appeal Brief, appellant further argues that neither '038 nor Rice suggest a metal-resin composite layer exhibiting non-conjugative properties

relative to thermally sprayed metal coating. The Examiner has reviewed appellant's arguments at pages 7-8 of the Appeal Brief, however, the rejection is maintained. As discussed with regard to pages 6-7 of the Appeal Brief, above, it is the Examiner's position that the combination of the cited art clearly indicates that the nickel-PTFE coating will be non-conjugative (the Examiner understands that conjugative means to "join together" and thus, the non-conjugative coating will be a coating to which the thermal spray coating does not stick, adhere or join with so that the thermal spray coating does not stick to the plugs). Appellant again first discussed '038 alone. However, one of ordinary skill in the art is directed to look at '038 due to the previous teachings of the admitted state of the prior art and Rice as to the suggestion to provide a TEFLON or mold release coating on a masking member, with Rice providing the suggestion to look to the art of "mold release coatings" for acceptable coatings, as described in the paragraph above. As to appellant's discussion of Rice, the Examiner notes that Rice does not teach that the mold release coating is only for a plastic molding die. Rice teaches that the mold release coating can be applied to a cup 362 which is the same as any of the other embodiments disclosed (paragraph [0044]), which in paragraph [0040] as cited by appellant, includes metals, such as aluminum or steel. As to the mold release coating not being a metal-resin composite, applicant has not indicated the basis for this position. If appellant is referring to the specific example of paragraph [0044] (Patent No. 6,291,026), the Examiner notes that this is merely exemplary (". . . a mold release such as that disclosed in U.S. Patnet No. 6,291,026 . . .",

paragraph [0044], emphasis added), and does not provide a limitation or range of what mold release coating materials can be used. Thus, one of ordinary skill in the art is again suggested to look to the art of mold release coatings, which includes '038, for possible mold release coating to use. As to the use of the Rice coating under mild coating conditions, and the only mention of ceramic coatings in Rice being in paragraph [0002], these are addressed in the discussion of pages 6-7 of the Appeal Brief above. As to appellant's further discussion of '038 not being indicated as non-conjugative to ceramic material, the Examiner notes the discussion of pages 6-7 of the Appeal Brief above. As previously noted, from a reading of the previously considered references, the admitted state of the prior art and Rice, one of ordinary skill in the art would understand that the materials described by '038 would be materials that would acceptably be used in a thermal spray process, as Rice clearly indicates that PTFE (TEFLON) can be used to reduce adherence of thermal spray droplets without a negative effect (paragraph [0044]) and both Rice and the admitted state of the prior art note that metal can be thermally sprayed on without being destroyed (note Rice, paragraph [0040], and the admitted state of the prior art noting the use of metal plugs, on which the coating adheres but is not destroyed). Therefore, when one of ordinary skill in the art looks at known mold release coatings, such as provided by '038, as directed by Rice, that person would understand that a metal-PTFE coating would be acceptably used in thermal spraying processes with the PTFE providing desirable non-adherence (non-conjugative) properties to thermal sprayed material and without the

metal being destroyed, even though '038 does not specifically say so, based on the combination of all three references. The non-conjugative features of the coating are noted by (a) '038 teaching that it is a mold release coating, which is what Rice indicates is needed for a coating that reduces adherence of thermal spray droplets, and also (b) that the coating's release properties are provided by PTFE (paragraph [0007] of '038) which is a material (by way of TEFLON) that Rice teaches reduces adherence of thermal spray droplets.

B. Ground 2: The 35 USC 103(a) rejection of claim 2-4 using the admitted state of the prior art in view of Rice et al (US 2003/0154919) and Japan 05-278308 (hereinafter '038), further in view of WO 01/54188, Pico, deceased et al (US411507) and Sherstinsky et al (US 5634266)

At page 9 of the Appeal Brief, appellant provides a discussion of the teachings of WO 01/54188, Pico and Sherstinsky. Then at pages 9-10 of the Appeal Brief, appellant argues that claims 2-4 are allowable for the reasons given in Part A of the Appeal Brief that claim 1 is allowable over the admitted state of the prior art in view or Rice and '038. No separate arguments are provided as to further features of claims 2-4 or the further references used. Therefore, after reviewing appellant's arguments, it is the Examiner's position that the claims remain properly rejected for the reasons discussed in Part A, as to claim 1, above.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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